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EXAMINER

BURD, KEVIN MICHAEL

| ART UNIT | PAPER NUMBER |
|----------|--------------|
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2631

DATE MAILED: 07/10/2003

60

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/395,490

Applicant(s)
JOHNSON ET AL

Examiner
Kevin Burd

Art Unit
2631



— The MAILING DATE of this communication appears on the cover sheet with the correspondence address —

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on May 1, 2003
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-35 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-35 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other: _____

Art Unit: 2631

DETAILED ACTION

1. This office action , in response to the amendment filed 5/1/2003, is a non-final office action.

Response to Arguments

2. The objection to the disclosure is withdrawn.
3. The rejection to the claims under 35 U.S.C. 112, second paragraph, is withdrawn due to the explanation provided on page 16 of Applicant's response.
4. Applicant's arguments filed 5/1/2003 have been fully considered but they are not persuasive.

Regarding the discussion of claims 17, 21, 30, 34 and 35, Jones discloses I and Q signals are input to a predistorter 107 on figure 2. Jones further discloses calculating values to upconvert the received signal. The final output rate is determined based on the I and Q inputs as stated in column 7, lines 22-45.

Regarding the discussion of claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 27-29, 31 and 32, the motivation to combine the references is stated on page 5 of the previous office action. "Perkins discloses it is well known to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique, helps achieve this lower power consumption (column 2, lines 30-44). It

Art Unit: 2631

would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a baseband signal using a look up memory technique for the reason stated above." In addition the combination of Jones and Perkins discloses the feedback to provide an input signal to the predistorter. Perkins discloses the lookup table memory 22g outputs an 8-bit value based on the magnitude of Q, and the value of I (column 8, lines 29-31). The I and Q values allows the proper output of the look up table to be output. This is the index value.

A new rejection for claims 16, and 27-29 is provided below.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under treaty defined in section 351 (a) shall have the effects for the purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 16 and 27-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Leyendecker et al (US 5,923,712).

Regarding claims 16 and 27-29, Leyendecker discloses an apparatus and method for adaptively predistorting a baseband signal (figure 4). The predistorter 407

Art Unit: 2631

predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 103. The predistorted 800 ksps component signals from the predistorter 407 are received by the digital interpolator 409 (column 7, line 50 to column 8, line 5). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 56-58). The interpolator filters the upsampled base band signal (column 8, lines 2-4). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. Leyendecker further discloses using the input I and Q signal to retrieve information from a look-up table (column 10, lines 35-58 and figure 6). The output signal is based on the information from the look-up table since the look-up table determines the predistortion that takes place. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 431 (figure 4). The trainer provides input signal to the look-up table (figure 6).

7. Claims 17, 21, 30, 34 and 35 are rejected under 35 U.S.C. 102(e) as being anticipated by Jones et al (US 5,920,808).

Regarding claims 17, 21, 30, 34 and 35, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 ksps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-

Art Unit: 2631

29). The signals are upsampled in the digital interpolator to increase the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-3, 8-12, 15, 18, 19, 22-24, 31 and 32 are rejected under 35 U.S.C.

103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Perkins et al (US 5,963,549).

Regarding claim 1, 9, 12, 18, 19, 22, 24, 31 and 32, Jones discloses an apparatus and method for adaptively predistorting a baseband signal (figure 2). The predistorter 107 predistorts the received in-phase and quadrature component signals to compensate for the distortion of the power amplifier 115. The predistorted 800 kbps component signals from the predistorter 107 are received by the digital interpolator 209 (column 7, lines 22-29). The signals are upsampled in the digital interpolator to increase

Art Unit: 2631

the sampling (column 7, lines 28-42). The interpolator filters the upsampled base band signal (column 7, lines 42-43). Filtering the signals eliminates high frequency harmonics in the system (column 4, lines 35-47). The output of the interpolator is a predistorted upsampled signal which is converted to RF signal for transmission. A receiver retrieves samples of the RF signals and feeds these signals to the trainer 131 (figure 2). Jones does not disclose clipping the signal in the predistorter. Perkins discloses it is well known to clip signals in a predistortion unit to reduce power requirements prior to transmission. Using a lookup table memory technique, helps achieve this lower power consumption (column 2, lines 30-44). It would have been obvious for one of ordinary skill in the art at the time of the invention to use the predistortion unit of Perkins to clip a baseband signal using a look up memory technique for the reason stated above.

Regarding claims 2 and 10, Jones discloses upconverting the 800 ksps signals to 3.2 Msps signal (column 7, lines 30-45).

Regarding claims 3, 11 and 23, Perkins discloses the I and Q components are summed prior to recovering lookup table information (column 2, lines 30-44).

Regarding claims 8 and 15, the signal is delayed by elements 112, 113 and 115 prior to being output of the system (Jones figure 2).

10. Claims 4, 5, 7, 13, 20, 25 and 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Jones et al (US 5,920,808) in view of Perkins et al (US 5,963,549) as

Art Unit: 2631

applied to claims 1-3, 8-12, 15, 16, 18, 19, 22-24, 27-29, 31 and 32 above, and further in view of Miyashita (US 6,288,610).

Regarding claims 4, 5, 7, 13, 20, 25 and 33, the combination of Jones and Perkins disclose an apparatus and method for adaptively predistorting a baseband signal as stated above. The combination does not disclose using the lookup table technique to predistort the baseband signal where the distortion characteristics are defined by polynomial equations having coefficients. Miyashita discloses the predistortion characteristics are defined by the polynomial equation shown in column 4, lines 60-68. The equation $g(x)$ is the expression of the envelope transfer function. It would have been obvious to incorporate the method of using a polynomial equation from a look up table to predistort a baseband signal as disclosed in Miyashita into the combination to correct distortion impairing linearity which occurs in the amplifier (column 3, lines 31-33).

Contact Information

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks
Washington, D.C. 20231

or faxed to:


(703) 872-9314, (for formal communications intended for entry or for informal or draft communications, please label "PROPOSED" or "DRAFT")

Art Unit: 2631

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Burd, whose telephone number is (703) 308-7034. The Examiner can normally be reached on Monday-Thursday from 9:00 AM - 6:00 PM.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703) 305-3800.


Kevin M. Burd
PATENT EXAMINER
July 8, 2003